

REMARKS/ARGUMENTS

Reconsideration of the above-identified application respectfully requested.

§103(a) Claim Rejection

Claims 1-12, 14, 15, 17, 19, 20, 39, and 40 stand finally rejected as being obvious over Ohno, Beall, and Knudson. Applicant respectfully traverses the rejection of the claims and basis therefor.

The Declaration of Dr. Dominic A. Cataldo

Dr. Cataldo, as an inventor on the subject application, conducted additional comparative tests using solvent as taught by Ohno and the subject disclosure. The details of the tests and results are set forth in the attached declaration.

First, just heating to be heating (with or without solvent) or to improve clay absorption misses the point of the present disclosure for at least 2 reasons. First, mixing and heating together as in Ohno, especially if the actives are solid below about 20°C, results in most of the active crystallizing of the surface of the clay. This fraction, which is generally greater than the absorbed fraction, serves no purpose with respect to the sustained release that the inventors have targeted (2 to >20 years) in their desired product applications. Second, for the extended performance longevities that the inventors target, the active must be contained within the intercalated clay structure, and not on the outside. This allows both the physical entrainment and ionic associations of the active within the clay structure to limit the mount of active entering the heated polymer (120° to 350°C) to be minimized during production, and maximizing the amount of active remaining intercalated within the clay. It is this intercalated fraction that is responsible for the reduced diffusion of active out of the clay, and through the polymer and, thus, to the target environment for very long periods of time.

When Dr. Cataldo blends heated liquid (or liquefied solid) actives, he adds the active heated above its melting point (by 10°-30°C), to the heated (same temperature) clay slowly while stirring in a (Henschel) blender, allowing max absorption within the clay, and stop while the mixture is still friable (not balled or gummy, indicating excess surface absorption and crystallization). Ohno does not reveal release rates. Instead, he reveals information on the effectiveness of his formulations in killing microbes over a period of only seven days (Column 12, Table 5). He considers seven days to be a long time. We deduce that his release rates are substantially higher than one would want for a long-term performance package.

In practice, if you go too far with active addition, then you have exceeded the clays capacity and, thus, the mixture is non-friable (gummy), and actually results in a lot of pesticide crystallized/or gummed to the outside of the clay--thus, causing the clay to stick together. In practice if you go this far, you do not have what the inventors teach. This friable characteristic of the clay carrier is critical to minimizing losses experienced in the 5-10 minutes process of formulation into thermoplastic/thermoset products (100° to 350°C), and optimizing product release needs. The data for the comparison of our method of creating a loaded-friable carrier, and Ruskin's method of mixing individual components and then heating in an extruder, show that release performance is much better with our approach.

The addition of an active dissolved in a solvent (even at saturation), has a similar effect. The clay does load easier, but on evaporation of the solvent, much of the active ends up diffusing out of the intercalated clays, and crystallizing on the outside of the clay. Additionally, the loading rate is inherently lower than disclosed method.

Early studies with solvent loading of trifluralin indicated that clays could be loaded to 6% to 50% using solvent; this is lower than the taught normal 43% level using the friable mixture method. The best the inventors could attain with trifluralin was 6%-12% (w/w using solvent addition to attain a friable mixture. Additionally, solvent incorporation leads in most cases a non-friable product unsuitable for extrusion of the final thermoplastic product.

The solvent loading data presented by Dr. Cataldo is illustrative of what happens with the Ohno process using solvent, even when heating is practiced. The submitted data of Dr. Cataldo testifies to this.

Finally, Ohno states that the usual case allows the clay and active ingredient to be combined in ANY MANNER and the active ingredient can be a SOLID, LIQUID, OR GAS. These are ridiculous limits. Very little sorption will occur if the active ingredient is a solid. These triazoles probably have a minute vapor pressure when heated enough to melt. Ohno's liquid example does not indicate that there is a preferred order of mixing and temperatures.

In view of the amendments, remarks, and declaration submitted herewith, allowance of the claims and passage to issue of this application respectfully requested. If allowance of the claims is not forthcoming, please enter this amendment for purposes of appeal.

Respectfully submitted,



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